

## **Fate and effects of fragrance material on the deposit feeder, *Capitella teleta***

Dai, Lina; Selck, Henriette; Salvito, Daniel ; Forbes, Valery E.

*Publication date:*  
2010

*Document Version*  
Peer reviewed version

*Citation for published version (APA):*  
Dai, L., Selck, H., Salvito, D., & Forbes, V. E. (2010). *Fate and effects of fragrance material on the deposit feeder, Capitella teleta*.

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain.
- You may freely distribute the URL identifying the publication in the public portal.

### **Take down policy**

If you believe that this document breaches copyright please contact [rucforsk@kb.dk](mailto:rucforsk@kb.dk) providing details, and we will remove access to the work immediately and investigate your claim.

# Fate and effects of fragrance material on the deposit feeder, *Capitella teleta*



Lina Dai<sup>1</sup>, Henriette Selck<sup>1</sup>, Dan Salvito<sup>2</sup> and Valery E Forbes<sup>1,3</sup>

<sup>1</sup>Roskilde University, DK-4000 Roskilde, Denmark

<sup>2</sup>Research Inst. for Fragrance Materials, Woodcliff Lake, NJ

<sup>3</sup>School of Biological Sciences, University of Nebraska Lincoln, LN

E-mail contact: [ldai@ruc.dk](mailto:ldai@ruc.dk)



## INTRODUCTION

**Fragrance materials (FMs)** have been used ubiquitously in perfume, cosmetics, detergents etc. The primary pathway of FMs into the aquatic environment is via down-the-drain.

**Acetyl cedrene (AC)** was included as a model compound. Due to the hydrophobicity of AC ( $\log K_{ow}=5.6-5.9$ , water solubility=1.28 mg/L), AC is likely to concentrate in sediment and pose risks to deposit-feeding organisms, such as *Capitella teleta*.

***Capitella teleta* (formerly *Capitella* sp. I)**: A deposit feeding organism that lives in sediments where it feeds on organic matter.

Both the high species density and feeding behavior of *C. teleta* could affect parent AC transport in aquatic sediment.

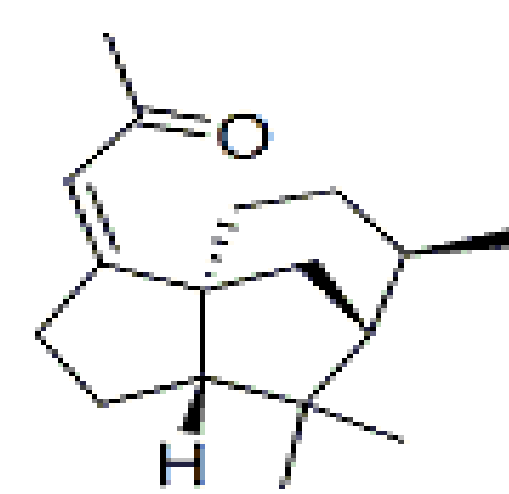
- *C. teleta* is found in highly polluted sediments at densities up to 400,000 individuals/m<sup>2</sup>;
- The worms feed at the sediment subsurface and defecate on the sediment surface;
- In addition, *C. teleta* ventilate their burrows with overlying sea water.

## AIM

**How does worm density affect the fate of sediment-associated AC?**

A study of the combined effect of worm density and organic matter (OM) on fate of AC in the aquatic environment.

## Experiment setup

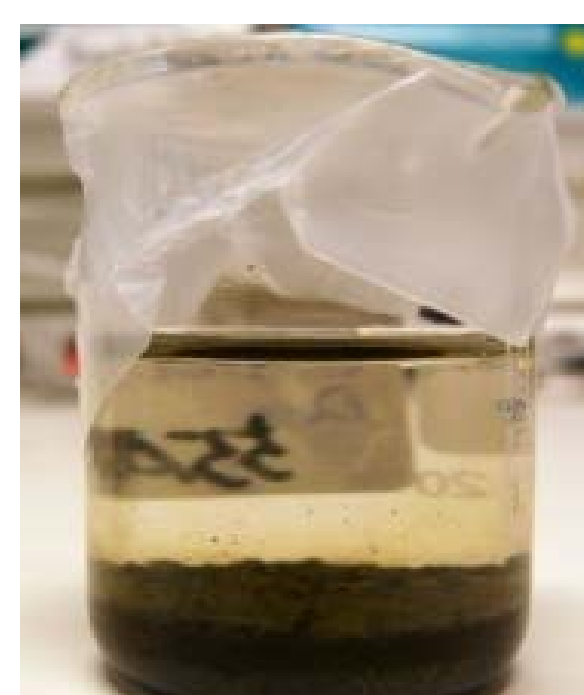


AC (0, 50 and 100 µg/g dw sed)

*Capitella teleta*



n= 0, 55 or 110



14 days

- Water
- Fecal pellets
- C. teleta*
- Sediment

- 3 replicates per treatment;
- AC quantifications in water, fecal pellets, *C. teleta* and sediment.

### Tested species density in the present study

Tested Density	Worms added in treatments
0 individuals per m <sup>2</sup>	0
44,000 individuals per m <sup>2</sup>	55 ind.
88,000 individuals per m <sup>2</sup>	110 ind.

## NEXT STEP...

Examination of AC metabolites in the exposure system (worm tissue, sediment, fecal pellets) to provide information about the biotransformation capability of AC by *Capitella teleta*.

## RESULTS

### Effect of AC on *C. teleta*

No lethal effect of sediment-associated AC on *C. teleta* after 14 days at 3 different exposure levels (0, 50, 100 µg/g dw sed).

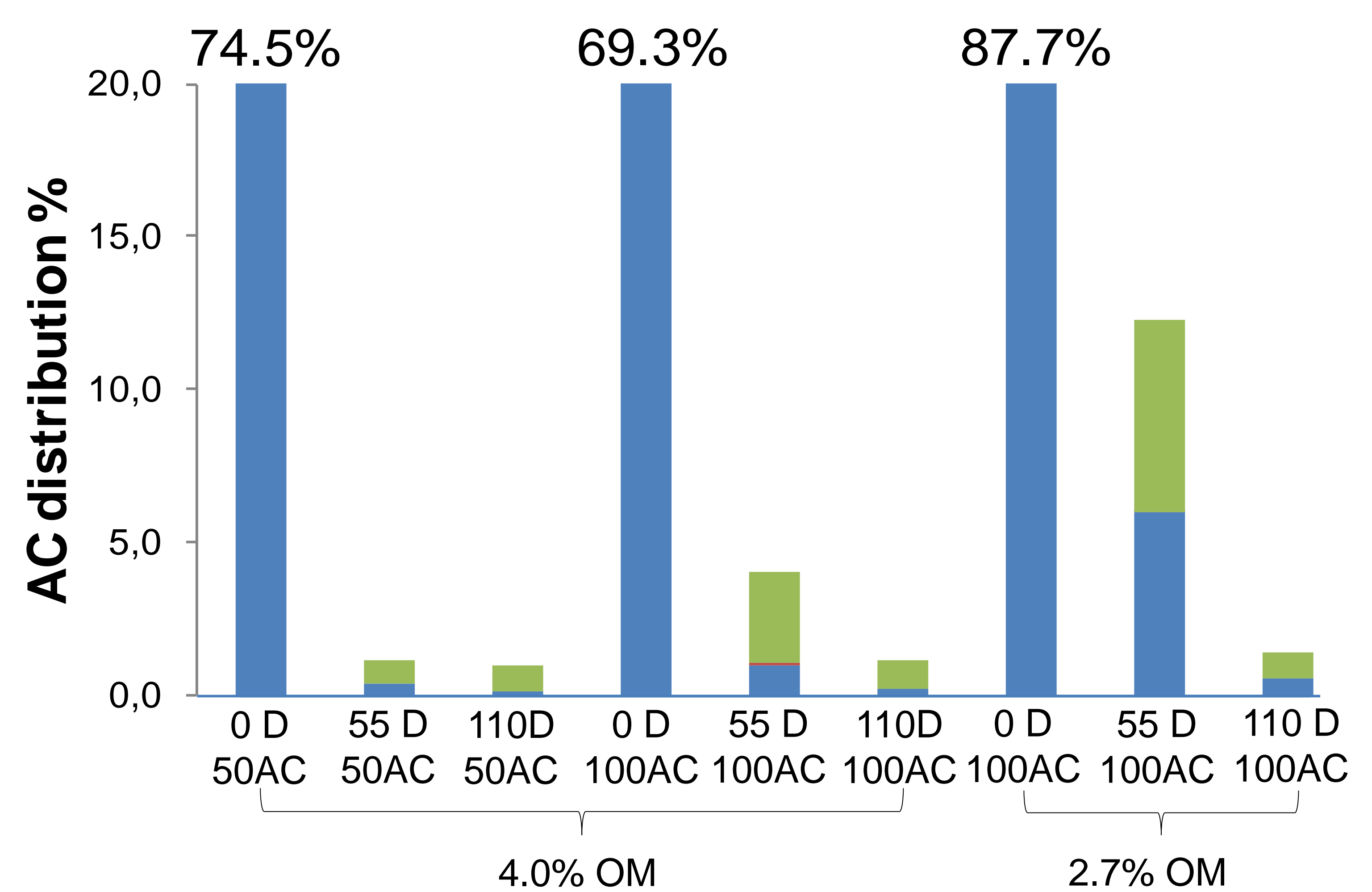
### AC fate in exposure system

AC was detected in fecal pellets, sediment and water.

More than 80% of AC had disappeared from the exposure systems with worms after 14 d

AC was concentrated in fecal pellets (> 11 times higher than in bulk sediment), and was not detected in *C. teleta* tissue after 14 days.

Increasing OM may facilitate AC removal.



■ *Capitella teleta* ■ Fecal pellets ■ Water phase ■ Sediment

**Figure: The distribution of AC in treatments after 14 days (%). The measurement was made in *C. teleta*, fecal pellets, water phase and sediment.**

## CONCLUSION

*C. teleta* significantly affected the fate of sediment-associated AC. After 14 days, most AC (>80%) had disappeared from exposure systems with worms. The concentrated AC in fecal pellets but not in worm tissue suggests either that AC is not bioavailable to *C. teleta* or that this species is able to biotransform sediment-associated AC (e.g., use AC as a carbon source).